

WE have received from Mr. A. C. Cossor, of Farringdon-road, E.C., an illustrated catalogue of Röntgen ray tubes, electrical instruments and fittings, and small electric lamps for all purposes. The catalogue should be of interest to physicists, medical men and others interested in high vacuum work.

THE fourth part of the second volume of "The Fauna and Geography of the Maldive and Laccadive Archipelagoes: being the Account of the Work carried on and of the Collections made by an Expedition during the years 1899 and 1900," edited by Mr. J. Stanley Gardiner, has been published by the Cambridge University Press. This part contains reports on the Alcyonaria of the Maldives by Prof. S. J. Hickson, F.R.S.; on marine crustaceans by Major Alcock, F.R.S., and Prof. H. Coutière; on hydroids by Mr. L. A. Borradaile; on Rhynchota by Mr. W. L. Distant; and notes on parasites by Mr. A. E. Shipley, F.R.S.

MESSRS. TEUBNER, of Leipzig, have just issued a fifth edition of Schlömilch's "Uebungsbuch zum Studium der höheren Analysis," part i., of which the first edition appeared in 1868, and a second edition of Dr. A. Föppl's "Einführung in die Maxwell'sche Theorie der Elektrizität," the first edition of which appeared in 1894. Of these, the former, which in England would be called a "treatise on the calculus," has been revised by Prof. E. Naetsch, of Dresden, and several new paragraphs on transformation of coordinates have been added. The work of editing Dr. Föppl's treatise has been undertaken by Dr. M. Abraham, who is preparing a second volume dealing with "theory of electromagnetic radiations."

OUR ASTRONOMICAL COLUMN.

JUPITER'S SEVENTH SATELLITE.—Circular 74 from the Kiel Centralstelle confirms the telegram received last week concerning the discovery of a seventh satellite to Jupiter.

It contains a message from Prof. Campbell in which he states that the object was discovered by Prof. Perrine, using the Crossley reflector. The position previously given, viz. position angle = 62° , distance from Jupiter $21'$, was that occupied by the satellite on February 25.6 (G.M.T.). The apparent motion was direct, and the orbit is considerably inclined to the ecliptic. This latest satellite has been under observation, with the Crossley reflector, since January 2, but no particulars of the observations, other than those for January 25, are given in the circular.

LONGITUDE OBSERVATIONS OF POINTS ON MARS.—Bulletin No. 14 from the Lowell Observatory contains the results of the longitude determinations of nearly sixty features on the surface of Mars made at Flagstaff during 1903. For each point the times of the several observations and the resulting longitudes are given, and these are followed by the mean value for the longitude and its probable error; the mean value for the latitude of each point is also given.

The longitudes were determined by noting the time of transit of each marking across the micrometer thread when the latter was placed parallel to the position angle of the polar axis, as given in Mr. Crommelin's ephemeris, and passing through the polar cap. As the thread obliterated the markings it became easier in practice to record the time at which the marking and the cap were equidistant from the thread.

Mr. Lowell has allotted a number to the result of each determination showing the relative weight to be attached to the value obtained.

OBSERVATIONS OF COMETS.—The comets 1904 *e* (Borrelly), 1904 *d* (Giacobini), and 1904 *a* (Brooks) have been regularly observed, at Lick, by Dr. R. G. Aitken, and the results are published in No. 69 of the Lick Observatory *Bulletins*.

Observations of comet 1904 *e* were made during the end of December and the beginning of January, and two sets of parabolic elements were computed from the results. Subsequent observations did not confirm these, and consequently Dr. Aitken computed elliptic elements from his

observations of December 31, 1904, January 17 and 27, 1905. When the observational values were compared with the places calculated from these elements, the agreement was found to be satisfactory, and it seems probable that the comet is moving in an elliptical orbit with a period of about 7.3 years. An ephemeris based upon these elements and extending to March 31 is given, and shows that on March 11 the comet will be only 0.27 as bright as at the time of discovery, when it was variously estimated as being of the tenth or eleventh magnitude.

Comet 1904 *d* was observed on January 28, and the observation showed that the orbit published in *Bulletin* No. 67 needs very little correction. From the comet's appearance on that date it is evident that this object will soon be beyond the reach of all but the most powerful telescopes. An ephemeris extending to April 3 is given.

Observations of comet 1904 *a* were made with the 12-inch refractor by Messrs. Maddrill and Aitken during the period June 21–September 4, 1904, and the results are given in the same circular. A footnote by Dr. Aitken states that the comet was still visible in the 12-inch telescope on January 26, and an observation made on that date showed that Prof. Nijland's ephemeris is very nearly exact.

THE GOVERNMENT OBSERVATORY AT VICTORIA.—We have received the annual reports of the board of visitors and the director of the Victoria (Australia) Observatory for the years ending March 31, 1903, and 1904.

The reports show that the routine work connected with the meridian observations, the time service, the meteorological, magnetic, and seismological observations, and instrument testing was carried out as usual.

On the later date the taking of the catalogue plates for the astrophotographic chart, to the number of 1149, had been completed, whilst satisfactory progress had also been made with the other sections of the work. The measurement of both the Sydney and the Melbourne plates is being carried out at Melbourne, and on March 31, 1904, 239 Sydney plates containing 137,812 stars, and 522 Melbourne plates containing 151,343 stars, had been completely measured. A new measuring machine designed by Mr. H. C. Russell was finished, and its fitness was being investigated when the report was issued.

The director, Mr. P. Baracchi, states that the work of measuring the magnetograph curves and reducing all the magnetic observations made since 1868 is progressing satisfactorily, and that he hopes the results will be published within the next two or three years.

OBSERVATIONS OF SATURN'S SATELLITES.—The results of a series of observations of the relative positions of the seven inner satellites of Saturn are published in *Bulletin* No. 68 of the Lick Observatory. The observations were made by Prof. Hussey with the 36-inch refractor between August 3 and December 2, 1904, and in each case the position angle and distance of the satellite in regard to one of the other satellites are given.

BRIGHT METEORS.—Mr. R. L. Jones, writing from 3 King's Bench Walk, Temple, E.C., refers to three bright meteors observed on the nights of February 27 and 28. All the three appear to have started from the constellation Monoceros, and to have tracked thence in a north-westerly direction. A brilliant meteor was also seen at 12.10 a.m. on March 1, its brightness far exceeding that of Venus.

THE MAGNETIC SURVEY OF THE UNITED STATES.

THE report for the year ending June 30, 1904, on the magnetic survey of the United States and its outlying territories has lately been issued by the authorities of the Coast and Geodetic Survey, and contains a long list of field observations of the magnetic elements made with the usual completeness, supported by results obtained in five fixed observatories. Two of the latter are at Porto Rico and Honolulu respectively.

The new feature in the present report is that the survey has been extended to the neighbouring seas both on the Atlantic and Pacific sides of North America, and it records the successful observation at sea of thirty-four values of

the Dip, and thirty-two of the Intensity, with fifty-two of the Declination.

The observations of the Declination were made with the ship's standard compass in the process of "swinging." Those for Dip and Intensity at the same time with the Lloyd-Creak (shortly L.-C.) dip circle, an instrument originally designed for sea observations of those elements, but which in field work on land has also been found to give results hardly inferior to those of the specially designed land instruments. The degree of accuracy hitherto obtained at sea as compared with land observations with the same instrument is also given.

The accompanying illustration shows the L.-C. circle mounted for observations on land and fitted on top with an arrangement proposed by the U.S. C. Survey for observing the Declination, but which also serves the purpose of placing the circle in the magnetic meridian. At sea the circle is mounted on a gimbal stand with the declination fitting removed, as the angle between the direction of the ship's head and the magnetic meridian is then obtained from the ship's standard compass.

A detailed description of the L.-C. circle is given in the

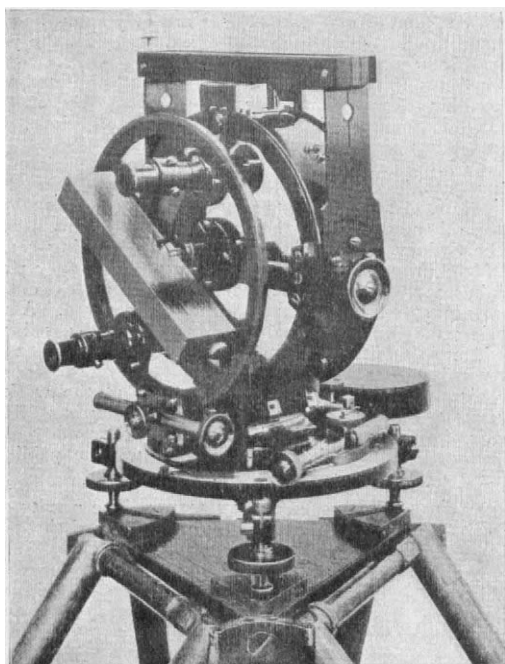


FIG. 1.—Lloyd-Creak Dip Circle, mounted for Observations on Land.

report with the methods adopted for observing therewith at sea in the U.S. surveying vessels, which are, however, not specially adapted to the work. A wood-built vessel, specially designed and devoted to magnetic work as a primary object, is required to obtain the full value from this instrument, and it is therefore pleasant to record that the magnetic survey of the North Pacific Ocean in such a vessel will be commenced this year by the United States.

THE NEST OF THE FIGHTING FISH.

IN most, if not in all, the members of the group of Oriental fishes typified by the so-called climbing perch (*Anabas scandens*), the males take charge of the eggs as they are extracted from the females and place them in a "nest" of mucus-covered bubbles, which they have previously prepared. A well-known representative of the family is the "fighting fish" (*Betta pugnax*), which takes its name from the circumstance that a semi-domesticated breed is kept by the Siamese for the sake of the sport offered by the combats of the males. Of this fish living specimens from Pinang have recently been in the possession of Mr. E. H. Waite,

of the Sydney Museum, who has published an illustrated account of their nesting habits in the *Records of the Australian Museum* for December last (vol. v. No. 5). Mr. Waite has obligingly sent us a copy of his original photograph of the nest, which is herewith reproduced.

Mr. Waite states that he received these fish early in April last year, and that the male almost immediately proceeded to blow bubbles, which it produced by rising periodically to the surface and taking in gulps of air. A circular mass of mucus-clad bubbles, about 3 inches in diameter, was soon produced; and in course of time several other layers were formed, which resulted in the final production of a large dome-shaped structure, as shown in the photograph. The structure was completed on the third day, when the female commenced to lay her eggs, which were received between the pectoral and ventral fins as they were extruded, and were then suffered to sink slowly in the water. Here they were collected by the expectant male, decked in his resplendent breeding colours, and placed, after being coated with mucus, below the mass of bubbles, to which they adhered. From three to seven eggs are extracted at a time, and the process is continued until there are from one hundred and fifty to two hundred. When the laying is over, the female is kept away from the nest to prevent her devouring the eggs, which are carefully tended by the male, being constantly moved and from time to time re-coated with slime.

On the third day the eggs hatched, the larvæ remaining beneath the shelter of the bubbles. From time to time some fell off, when they were immediately replaced by the watchful male, but in a day or two the numbers which became de-



FIG. 1.—Nest of the Fighting Fish. About two-thirds natural size. From a photograph by Mr. Waite.

tached were too many for him to secure, although he frequently had seven or eight in his mouth at once. Some were, however, recovered from the bottom of the tank and returned to the shelter of the nest, but many were devoured by the female. Eventually all the larvæ died, and, although the fishes bred on two other occasions, none of the offspring were reared.

SOME RECENT WORK OF THE U.S. GEOLOGICAL SURVEY IN THE WESTERN STATES.¹

IF it be possible for envy to lurk in the breast of the scientific worker, then surely might we look for it in the geologist of these islands when he regards the lot of his fellow-worker across the Atlantic. In the breadth of field open to research, in the freshness of the land, and in the public support accorded to his labours, the geologist of the present day in the United States may justly claim preeminence. In the four memoirs before us, a mere random selection from the recent publications of the U.S.

¹ "Zinc and Lead Deposits of Northern Arkansas." By G. I. Adams and others. Pp. 115; with 17 plates and 6 figures.

"The Copper Deposits of the Encampment District, Wyoming." By A. C. Spencer. Pp. 107; with 2 plates (maps) and 49 figures.

"Economic Resources of the Northern Black Hills." By J. D. Irving and others. Pp. 222; with 20 plates and 16 figures.

"A Geological Reconnaissance across the Bitterroot Range and Clearwater Mountains in Montana and Idaho." By W. Lindgren. Pp. 123; with 15 plates and 8 figures.

Being "Professional Papers" Nos. 24, 25, 26 and 27 of the U.S. Geological Survey. (Washington, 1904.)